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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,068	01/22/2004	Xiaogang Peng	40715-296579	3712
23370	7590	10/23/2007	EXAMINER	
JOHN S. PRATT, ESQ			TSOY, ELENA	
KILPATRICK STOCKTON, LLP			ART UNIT	PAPER NUMBER
1100 PEACHTREE STREET			1792	
ATLANTA, GA 30309			MAIL DATE	DELIVERY MODE
			10/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/763,068	PENG ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Elena Tsoy	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) Responsive to communication(s) filed on 06 July 2007.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) Claim(s) 1-98 and 100-108 is/are pending in the application.  
 4a) Of the above claim(s) 1-57, 69-98 and 100-108 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 58-68 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers:

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 22 January 2004 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Request for Reconsideration***

The Request for Reconsideration filed on July 7, 2007 has been entered. Claims 1-98, and 100-108 are pending in the application. Claim 99 has been cancelled. Claims 1-57, 69-98, and 100-108 are withdrawn from consideration as directed to a non-elected invention.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
2. Claims 58-68 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Reiss et al (*Nano Letters*, 2 (7), 781 -784, 2002) in view of Kondow et al (US 5300793) and Nicolau (US 4675207) for the reasons of record set forth in paragraph 3 of the Office Action mailed on 4/2/2007.

***Response to Arguments***

3. Applicants' arguments filed July 7, 2007 have been fully considered but they are not persuasive.

(A) Applicants traverse the rejection of claims 58-68 under 35 U.S.C. § 103(a) as being unpatentable over Reiss in view of Kondow and Nicolau. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

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The Examiner respectfully disagrees with this argument. The secondary references Kondow and Nicolau teach that changing simultaneous addition of cationic and anionic constituents as in Reiss to alternating addition would provide deposition of monocrystalline or polycrystalline, fault-free, compact layers of compounds of formula  $C_mA_n$  ( $C$  represents a cation,  $A$  represents an anion) having *homogeneous* thickness and desired *stoichiometry* of the deposited compounds in contrast to deposition in solution with simultaneous addition of cationic and anionic constituents advantages. Thus, the secondary references of Kondow and Nicolau provide a *strong motivation* to change operation in Reiss to a better operation, i.e. changing operation in Reiss would be *prima facie* obvious.

(B) As recognized by the Office Action, Reiss discloses a one-step method for the production of core/shell nanocrystals having impressively high photoluminescent efficiency.

The Examiner takes official notice that it is a common knowledge in the art that *homogeneous* thickness and desired *stoichiometry* of the deposited shell in CdSe/ZnSe core/shell nanocrystals would provide better photoluminescence (PL) efficiency than core/shell nanocrystals. For example, Reiss teaches that structural defects decrease PL (See page 782, paragraph 1). Note also US 5319219 to Cheng et al showing at column 6, lines 37-44, that the ALE techniques for growing the quantum well layer enables better composition control, better control of the quantum well *thickness* and luminescence efficiency and increased room temperature photoluminescence intensity than random alloy quantum wells grown by conventional MBE.

(C) Moreover, the Office Action does not provide any motivation or suggestion to modify the method of Reiss with Kondow and Nicolau. As provided above, the Office Action states that Reiss discloses "a method for preparing CdSe/ZnSe core shell nanocrystals having

impressively high photoluminescence (PL) efficiency." In view of the efficacy of Reiss in producing core/shell nanocrystals, Applicants respectfully assert that one of skill in the art would find no motivation to modify the method of Reiss in an attempt to arrive at a method of the present invention.

The Examiner respectfully disagrees with this argument. The "impressively high photoluminescence (PL) efficiency" of Reiss is only 60 %, which would reach 85% only after annealing to decrease structural defects (See page 782, paragraph 1). Consequently, changing operation according to Kondow and Nicolau would be very advantageous because it would provide the same structure as of Reiss only *with no structural defects* and without the need of annealing.

(D) Reiss fails to teach shell formation by separate and alternating application of a cation precursor and an anion precursor to a solution of core nanoparticles. For this step, the Office Action relies upon Nicolau. Nicolau describes a method for depositing a thin layer on a substrate comprising immersing the substrate in a cationic solution and an anionic solution in an alternate manner with rinsing between immersions. Reiss in view of Nicolau does not provide a reasonable likelihood of success in producing core/shell nanocrystals according to methods of the present invention. The bulk substrate of Nicolau is large and unitary providing more than sufficient surface area for adsorption of the cationic and anionic species. These properties are inherently inconsistent with the innumerable core nanocrystal substrates in methods of the present invention. The nanometer scale of each nanocrystal substrate does not provide a large surface area for reaction with cationic and anionic chemical species for forming a shell. Reiss and Nicolau provide no indication that the cationic and anionic species can effectively find the nanometer scale surface areas of core nanocrystals dispersed in a dynamic solution environment.

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The Examiner respectfully disagrees with this argument. In contrast to Applicants argument, the nanometer scale of each nanocrystal substrate does provide a large surface area for reaction with cationic and anionic chemical species for forming a shell because the size of core nanocrystal is enormous compared to the size of cations and anions. See, for example, US 6319426 to Bawendi et al showing a bilayer molecule in FIG. 5B in which an inner layer 40 includes a molecule 42 (here TOPO) having a linking moiety 44 with an affinity for the semiconductor surface of CdSe **nanocrystal** (See column 17, lines 45-56).

Therefore, one of ordinary skill in the art would have reasonable expectation of success in changing operation of Reiss to alternating addition.

(E) Applicants argue that the substrate of Nicolau is capable of being removed and rinsed between solution immersions, thereby precluding premature solution combination of anionic and cationic species.

The argument is unconvincing. First of all, claims do not require a step of removing and rinsing. Second, nanocrystals of Reiss are also capable of being removed and rinsed between solution immersions.

### *Conclusion*

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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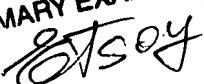
CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Thursday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy, Ph.D.  
Primary Examiner  
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ELENA TSOY  
PRIMARY EXAMINER  


October 17, 2007